



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :  E04G 23/00		A1	(11) International Publication Number: <b>WO 99/13185</b>
			(43) International Publication Date: 18 March 1999 (18.03.99)
<p>(21) International Application Number: PCT/US98/18427</p> <p>(22) International Filing Date: 3 September 1998 (03.09.98)</p> <p>(30) Priority Data: 60/058,487 10 September 1997 (10.09.97) US</p> <p>(71) Applicant: CERTAINTEED CORPORATION [US/US]; 750 East Swedesford Road, P.O. Box 860, Valley Forge, PA 19482-0101 (US).</p> <p>(72) Inventors: STOREY, Robert, W.; 40 Beaver Run, Downingtown, PA 19335 (US). TOAS, Murray, S.; 1901 Coles Boulevard, Norristown, PA 19401 (US). PACANA, David, M.; 146 Bridge Street, Spring City, PA 19475 (US). PONDER, Thomas, E.; 1 South Manor Road, Broomall, PA 19008 (US).</p> <p>(74) Agent: CRONK, Peter, J.; Duane, Morris &amp; Heckscher LLP, One Liberty Place, Philadelphia, PA 19103 (US).</p>			(81) Designated States: BR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
			<p><b>Published</b>  <i>With international search report.</i></p>
<p>(54) Title: FLEXIBLE MINERAL FIBER DUCT WRAP INSULATION BLANKET INCORPORATING A STRIP OF ADHESIVE FOR SECURING ADJACENT BLANKETS</p> <p>(57) Abstract</p> <p>Insulation blankets useful for application to heating, ventilation or air conditioning ducts are provided. In a preferred insulation blanket (5), a wool blanket layer (15) including a plurality of mineral fibers is provided. The wool blanket layer (15) includes a first lateral edge portion. A facing layer (25) is adhered to the wool blanket layer and a flap (10) extends from the first lateral edge portion of the wool blanket layer (15). The insulation blanket (5) further includes adhesive means (20) for permitting the flap (10) of the insulation blanket (5) to be adhesively attached to an adjacent insulation blanket portion or layer (40). The adhesive means (20) of this invention can be located either on the flap or on a lateral edge portion opposite the flap for connecting to adjacent insulation blanket portions or layers.</p>			

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**FLEXIBLE MINERAL FIBER DUCT WRAP INSULATION BLANKET  
INCORPORATING A STRIP OF ADHESIVE FOR SECURING ADJACENT  
BLANKETS**

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**FIELD OF THE INVENTION**

This invention relates to a mineral fiber insulation blanket for insulating ductwork. More specifically, the invention relates to a mineral fiber insulation blanket incorporating a 10 strip of adhesive flange for securing adjacent blankets during installation thereof.

**BACKGROUND OF THE INVENTION**

Insulation of heating, ventilating, and air conditioning ductwork is often provided through the application of a flexible blanket of an appropriate insulation material. Such 15 ductwork can be round, square or rectangular in cross sectional configuration. Typically, the ductwork is made of metal and is used in commercial, industrial, and residential buildings. The insulation material used to insulate such duct work is often comprised of mineral fibers, either fiber glass or rock wool.

A number of companies manufacture and supply mineral fiber duct wrap specifically 20 adapted to insulate duct work. Many of these products are comprised of fiber glass. These products are sold in roll form and comprise a blanket of glass fibers bonded together with a thermosetting resin. The use of such products reduces unwanted heat loss or gain from equipment and ductwork, thereby resulting in lower operation costs, greater comfort, and reduced energy consumption. Additionally, the acoustical properties of the insulation can 25 reduce the transmission of sound from the ductwork.

In addition to the insulation of ductwork, products of this type are also useful in insulating tanks and equipment. Duct wrap is available in both faced and unfaced form. The

facing material frequently consists of an FSK or a vinyl-film vapor retarder. FSK is a glass-scrim reinforced laminate of aluminum foil and kraft paper bonded together with a flame-retardant adhesive. Typically, the inner kraft surface of the FSK laminate is adhesively bonded to the fiber glass blanket. The use of such facing materials helps control

5 condensation during operation of the heating, ventilation or air conditioning system, as they constitute an effective vapor retarding layer.

The flame-retardant properties of the adhesive utilized in conjunction with the facing are important in applications where building codes mandate the use of insulation materials which have such properties. Frequently, a water based adhesive material is utilized in  
10 bonding the facing material to the numeral fibers. For applications in which the insulation material will be subjected to high temperatures (heated air in ducts up to 350 degrees Fahrenheit), unfaced duct wrap is recommended.

Fiber glass duct wrap is commercially available in various densities and thicknesses depending on the specific application for which the product is to be used. Increasing the  
15 density of the duct wrap improves its thermal performance. Heavier density duct wraps are more efficient insulators and provide better compression resistance during installation. The thickness of the duct wrap insulation typically ranges from 1 1/2" to 3".

Duct wrap is sold in rolls of various lengths (usually from 50 to 100 feet). The width of the mineral fiber blanket utilized in producing rolls of duct wrap is typically 48 inches. On  
20 faced products, the facing material is typically 50" wide and is adhered to the mineral fiber blanket in such a way as to extend 2" over one lateral edge of the mineral fiber blanket thereby providing a stapling and taping flap, flange or tab which, in a completed installation, overlaps an adjacent section of insulation to assist in securing the sections together and to provide a continuous vapor retarding layer. This flap, flange or tab can be referred to as a

"factory fabricated flap."

The material is installed by cutting appropriate lengths of material from the roll to accommodate the perimeter of the duct to be insulated, taking into account the thickness of the insulation material. Accordingly, a somewhat greater length of material is utilized than 5 the perimeter of the ductwork. Most duct wrap manufacturers provide a chart which specifies the additional length of material to be utilized in ducts of various perimeter lengths and cross sectional shapes. These charts also take the thickness of the duct wrap into consideration. The length of insulation that is added due to the outside perimeter of the installed, compressed insulation being larger than the outside perimeter of the duct is known as 10 "Stretch-Out Dimension," meaning the unrolled length of duct wrap sufficient to insulate a duct of a given perimeter material of a given thickness and density.

When installing faced duct wrap, once an appropriate length of material is cut from a roll, most manufacturers recommend that a 2" length of insulation extending the full width of the blanket be removed from the facing at one end thereof to form an overlapping stapling 15 and taping flap, flange or tab running the width of the material. (This can be referred to as a "field fabricated flap." The length of material is then securely wrapped around the perimeter of the ductwork with the facing exposed. The field fabricated flap is positioned to overlap the abutting opposite end of the length of insulation and stapled and/or taped in place. Subsequent sections or lengths of duct wrap are installed in essentially parallel relationship to 20 the first section and in such a manner so that the system. The present invention as described hereinafter solves the aforementioned problems associated with the taping of the lateral seams between adjacent lengths of duct wrap.

While some commercially available products for insulating pipes do incorporate a method similar to that disclosed herein to eliminate the necessity of subsequently taping the

longitudinal seams of the pipe insulation, applicant is not aware of any such method being utilized to tape the lateral or circumferential seams which extend between pieces or sections of such insulation. Moreover, pipe insulation is generally less flexible than duct wrap and is sold in specific sizes to insulate pipe of a given diameter which is typically significantly

5 smaller than the diameter of heating, ventilating and air conditioning ductwork. The material is also sold in a cylindrical shape with a slit running the length of the cylinder to enable installation. Additionally, because pipes are smaller in diameter than ductwork, it is typically easier to tape adjacent pieces or sections of pipe insulation in the conventional manner.

Accordingly, there was no need to develop a method to eliminate the need to manually tape

10 the circumferential seams between adjacent pieces or sections of pipe insulation.

#### SUMMARY OF THE INVENTION

The instant invention comprises an improved faced mineral fiber duct wrap insulation blanket which includes a strip of adhesive material adhered to the facing material along the

15 length of the material near an edge thereof. In a preferred embodiment, the adhesive is deposited on the facing material through the use of a pressure sensitive transfer tape. In one embodiment, the adhesive transfer tape comprising a release liner and an appropriate pressure sensitive adhesive adhered to one major face thereof is located on and extends along the factory fabricated flap which extends beyond the lateral edge of the mineral fiber blanket.

20 When situated on the factory fabricated flap, the tape is located on the same major surface of the facing material as is adhered to the mineral fiber blanket.

In another embodiment, the transfer tape is positioned along the other lateral edge of the major surface of the duct wrap facing, and, when so positioned, is located on the major surface of the facing opposite that to which the mineral fiber blanket is adhered. After

installation of the duct wrap, the release liner portion of the transfer tape is removed leaving a layer of adhesive on the facing in such a position as to facilitate the sealing of the lateral seams created during the installation by adherence to the factory fabricated flap of an adjacent piece or section of duct wrap.

5 Pressure sensitive transfer tape is well known to those familiar with various forms of pressure sensitive tapes generally and is commercially available in roll form which can be applied to the facing of the duct wrap during the manufacturing process. Such tapes comprise a release layer coated on one major surface thereof with a pressure sensitive adhesive material. When the tape is adhered to an appropriate material and the release liner 10 subsequently removed, the adhesive material is transferred from the liner to the other material. Accordingly, when used in conjunction with a faced duct wrap insulation material in accordance with the present invention, the pressure sensitive transfer tape is adhered as desired along a major surface of the facing material at or near a lateral edge thereof. When the release liner is removed during installation, the adhesive material has been transferred to 15 the duct wrap facing material which is then secured to the facing material of an adjacent abutting section of duct wrap.

The adhesive utilized in conjunction with the transfer tape can be formulated to have flame retardant properties if so desired.

Another embodiment of the present invention includes the application of a double 20 sided pressure sensitive tape at essentially the same location and in a similar manner as the transfer tape described above is utilized. Such double sided pressure sensitive tapes are well known and include a web or substrate coated on both major surfaces thereof with an appropriate adhesive material. A release liner is positioned on one major surface of the tape and the other surface is adhered to the facing material at a desired location. During

installation of the duct wrap, the release liner is removed thereby exposing the underlying pressure sensitive adhesive layer which is then adhesively secured to a desired adjacent area of facing material. Such double sided adhesive tapes are commercially available and are typically sold in roll form. Ideally such tapes are applied during manufacture of the duct

5 wrap through an appropriate in-line means. A double sided adhesive tape can be applied to either the factory fabricated flap or the opposite major surface of the facing along the other lateral edge of the duct wrap as described above for the release tape.

A further embodiment of the captioned invention includes the direct application of pressure sensitive adhesive to a desired portion of the facing material itself and subsequently

10 positioning a release liner over the adhesive to prevent the adhesive from coming into contact with other portions of the product when the product is rolled for shipping, storage and handling. Again, the adhesive can either be applied along the factory fabricated flap or along the opposite major surface at or near the other lateral edge thereof.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a section of faced duct wrap insulation which includes a strip of pressure sensitive transfer tape, double sided pressure sensitive tape, or adhesive material located on the factory fabricated flap which extends along one edge of the duct wrap and on the same major surface of the facing which is adhered to the mineral fiber blanket.

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Figure 2 shows another embodiment of the invention in which a strip of pressure sensitive transfer tape, double sided pressure sensitive tape, or adhesive material is located on the opposite major surface of the facing material at or near the opposite lateral edge of the facing material from that incorporating the factory fabricated flap.

Figure 3 shows a section of ductwork insulated in accordance with the present

invention.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 shows a perspective view of a length of duct wrap insulation 5 made in accordance with the present invention and includes mineral fiber blanket 15 adhered to the 5 inside surface of an appropriate facing material 25. The blanket 15 and facing material 25 are adhered together with an appropriate adhesive material which may or may not include flame-retardant properties. As can be seen in figure 1, facing material 25 extends beyond one lateral edge of the mineral fiber blanket to form flap 10, on the inside surface of which is applied an appropriate adhesive material 20. Flap 10 can be from 1" to 6" wide, but in a 10 preferred embodiment is approximately 2" wide.

Adhesive material 20 can be applied to flap 10 in the form of a pressure sensitive transfer tape, a double-sided pressure sensitive adhesive tape, or simply as a direct application of adhesive on the flap 10. Where a pressure sensitive transfer tape is utilized, the tape preferably comprises a release liner coated on one side thereof with an adhesive 15 material. The tape can be applied to flap 10 along the length of the flap during the manufacturing process through an appropriate in-line method before the duct wrap is cut into segments such as that depicted in figure 1. The tape is applied to the flap with the adhesive coating on the inside surface of the flap. The transfer tape can have a length and width which approximately conform with the length and width of flap 10. In a preferred embodiment, the 20 transfer tape can have a slightly longer width than flap 10 in order to facilitate removal of the release liner during installation of the product. For example, in a preferred embodiment in which the width of the flap 10 is 2", the release liner can be 2 1/4" wide, and is placed along the width of the flap such that there is 1/4" of exposed liner on one side of the flap. Moreover, the adhesive coating on the release liner need not extend the entire width of the

liner.

During installation of the duct wrap, the release liner is removed thereby exposing the adhesive on the inside surface of flap 10, which during installation is facing the ductwork 30 as shown in figure 3. As also shown in figure 3, sections of duct wrap 40 and 50 are cut to an appropriate length to extend around the perimeter of the duct. In another embodiment, as shown in figure 4, a section 45 of the insulation blanket 15 extending the entire width of the blanket is removed from one end of the duct wrap prior to installation leaving the facing material 25 intact to form a stapling and/or taping flap ("field fabricated flap" ) for overlapping the abutting opposite end of the section of duct wrap once it is positioned around the perimeter of the duct 30 in accordance with figure 3. Figure 4 also shows flap 10 coated with adhesive material 20. As depicted in figure 3, adhesive coated flap 10 of duct wrap section 50 overlaps the outer surface (facing outwardly from the duct in figure 3) of facing 25 of an adjacent piece or section of duct wrap 40 along the abutting lateral edge 60 thereof. Adjacent pieces or sections of duct wrap are installed such that the flap of one piece or section of insulation overlaps the outer surface of the adjacent piece or section of insulation along the opposite lateral edge from that which includes the flap in a like fashion to that depicted in Figure 3. Once the adhesive coated flap is appropriately positioned on the facing of an adjacent piece or section of duct wrap, adequate pressure is applied by appropriate means to provide an adequate bond between the two layers.

With reference to figure 1, where a double-sided pressure sensitive adhesive tape is utilized in place of the transfer tape described above, the tape can be applied to flap 10 through an appropriate in-line method during the manufacturing process in similar fashion to the method used in the case of a transfer tape. Typically, both pressure sensitive transfer tapes and double sided pressure sensitive adhesive tapes are available in roll form. During

installation of the duct wrap, the release liner is removed thereby exposing the adhesive which is used to secure the inside surface of flap 10 to the corresponding location along the opposite lateral edge on the outer surface of the facing material of an adjacent piece of duct wrap.

5 In an embodiment in which a layer or strip of adhesive is directly applied to the top of flap 10, such can also be applied in an appropriate in-line process, and a release liner placed over the adhesive to prevent the adhesive from contacting other portions of the product during packaging, shipping or handling thereof. During installation, this embodiment is installed in a similar fashion to that described above for the pressure sensitive release tape  
10 and double-sided adhesive pressure sensitive tape, and as depicted in figure 3.

Preferably, the facing material is made of an FSK or a vinyl-film vapor retarder, but can also be made of another appropriate material having vapor retarding characteristics.

Figure 2 depicts another embodiment of the invention in which the pressure sensitive release tape, double-sided pressure sensitive adhesive tape, or the adhesive is applied to the  
15 outer surface of the facing material 25 along or near the lateral edge thereof 35 which is opposite to that along which flap 10 extends. During installation of the duct wrap, the adhesive located on the outer surface of the facing is exposed through removal of the release tape, and the flap 10 of an adjacent section of duct wrap is positioned over the adhesive coated section thereof in accordance with figure 3. Once appropriately positioned in  
20 accordance with figure 3, the overlapping flap is secured to the facing of the adjacent section of duct wrap through the application of adequate pressure by an installer. If this method is utilized, additional sections of duct wrap insulation are installed in the same manner as depicted in figure 3 until the duct work is covered with a layer of insulation material.

As indicated previously herein, the present invention can be utilized to insulate tanks

and equipment in addition to duct work. Furthermore, the above detailed description of the invention is provided for the sake of explanation and it should be apparent that various modifications and substitutions, other than those described, can be made without departing from the scope of the invention as described herein.

**We claim:**

1. A mineral fiber insulation blanket [5], characterized by:
  - a wool blanket layer [15] including a plurality of mineral fibers, said wool blanket layer [15] having a first lateral edge portion;
  - 5 a facing layer [25] adhered to said wool blanket layer;
  - a flap [10] extending from said first lateral edge portion; and
  - adhesive means [20] for permitting said flap [10] of said insulation blanket [5] to be adhesively attached to an adjacent insulation blanket portion or layer [40].
2. The insulation blanket of Claim 1, wherein said mineral fibers comprise glass fibers.
- 10 3. The insulation blanket of Claim 1, wherein said flap comprises a portion of said facing layer.
4. The insulation blanket of Claim 1, wherein said pressure-sensitive adhesive means is disposed on said flap.
- 15 5. The insulation blanket of Claim 1, wherein said pressure-sensitive adhesive means is disposed on a surface of said adjacent insulation blanket portion or layer.
6. The insulation blanket of Claim 1, wherein said facing layer comprises a reinforced paper layer.
- 20 7. The insulation blanket of Claim 1, wherein said blanket is disposed in a roll form.
8. The insulation blanket of Claim 1, further comprising a release liner disposed over said pressure-sensitive adhesive means.
9. The insulation blanket of Claim 8, wherein said pressure-sensitive adhesive means comprises a double-sided adhesive tape.

10. An insulated duct characterized by:

a longitudinally extending duct;

a mineral fiber insulation blanket wrap comprising a first wool blanket layer

including a plurality of mineral fibers, said wool blanket layer having a first lateral edge

5 portion, a facing layer adhered to said wool blanket layer, a flap extending from said first

lateral edge portion, and pressure-sensitive adhesive means for permitting said insulation

blanket to be adhesively attached to an adjacent insulation blanket layer or portion disposed

along said duct.

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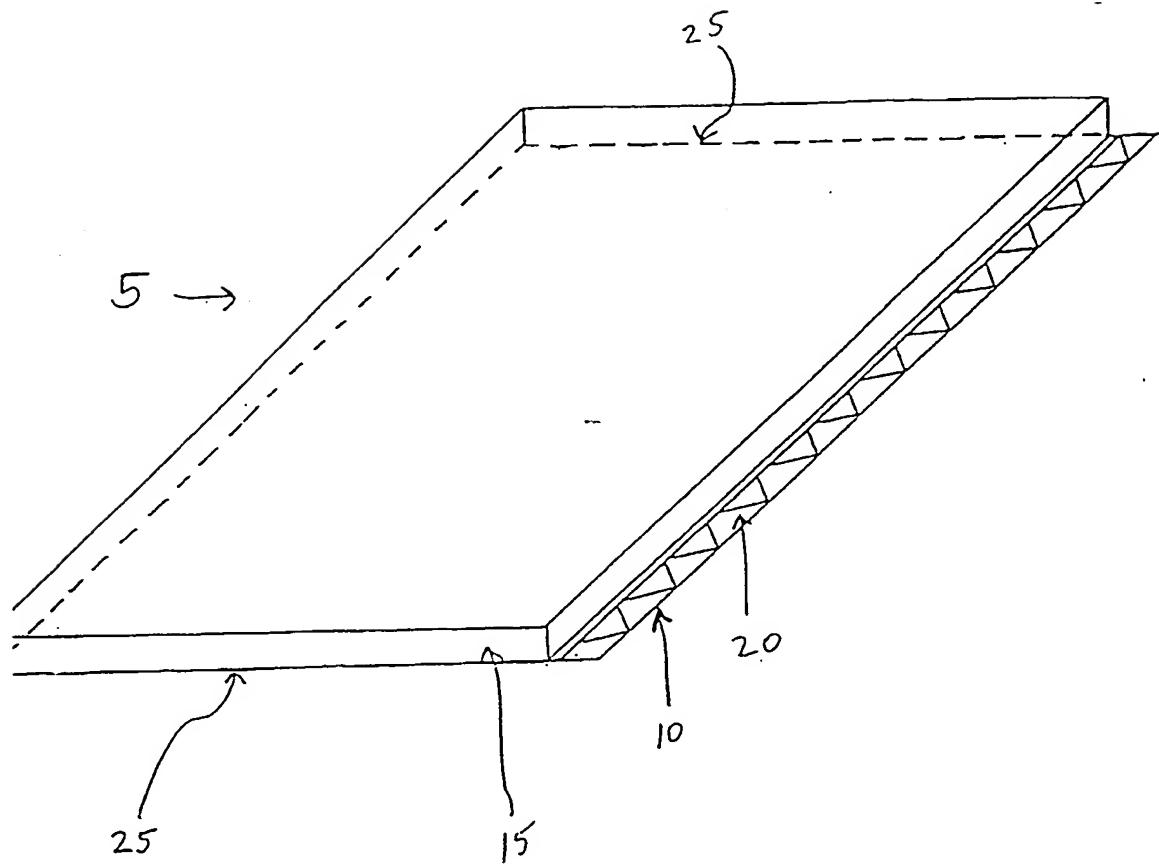


Figure 1

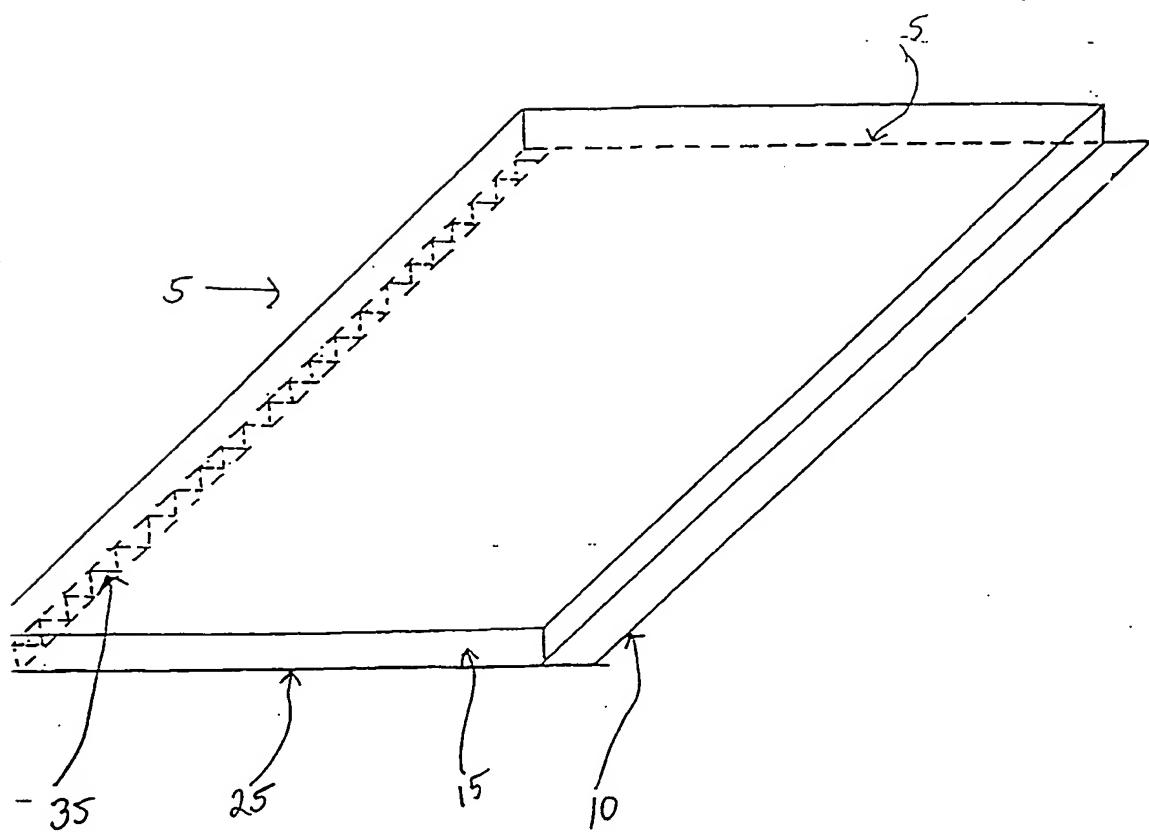


Figure 2

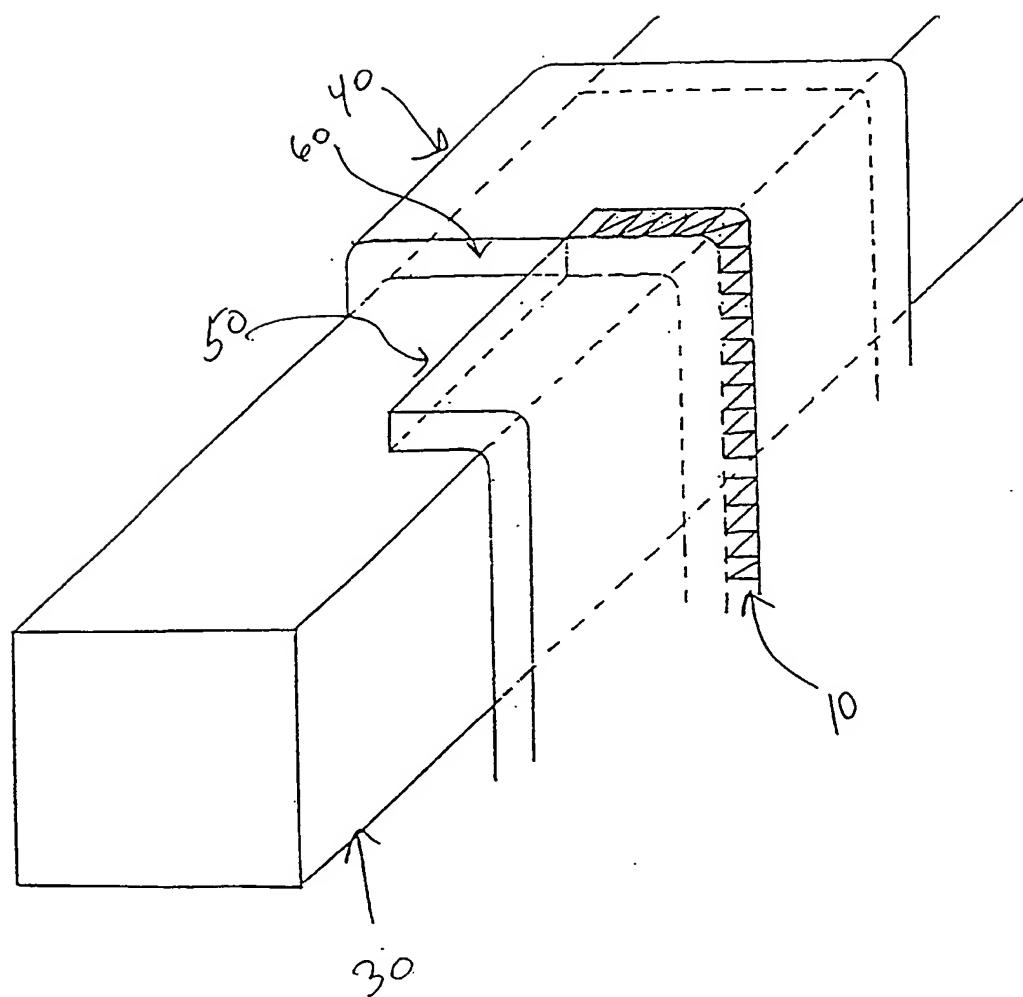


Figure 3

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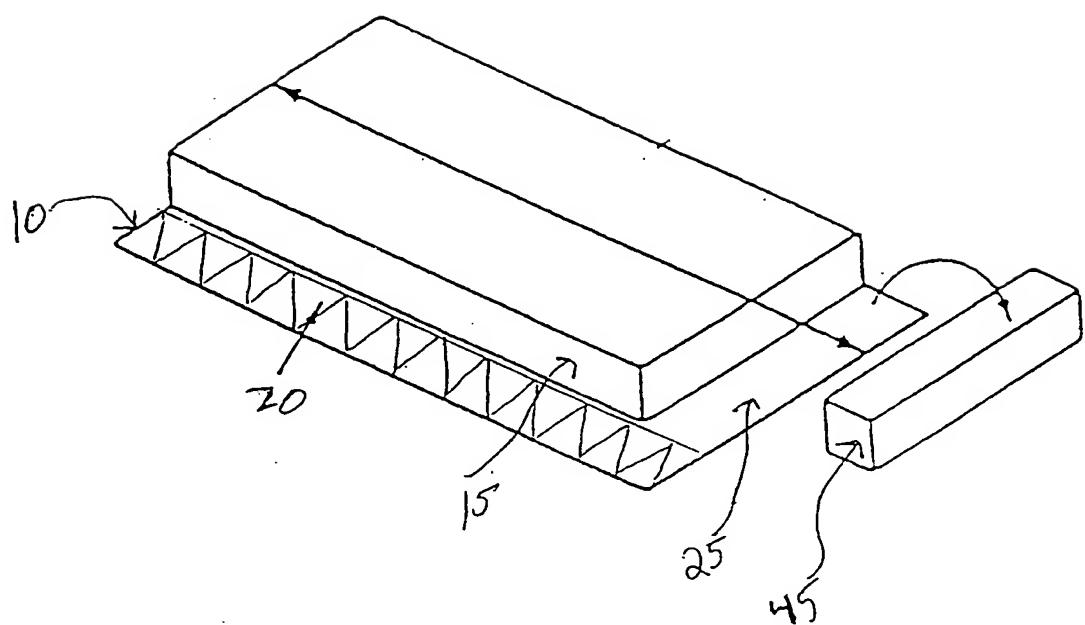


Figure 4

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/18427

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :E04G 23/00

US CL :52/741.4; 28/61, 78

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 52/741.4; 28/61, 78

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,265,953 A (CLOSE) 05 May 1981, see figures.	1-10
A	US 5,564,250 A (KESSLER) 15 October 1996, see figures.	1-10
A	US 3,979,537 A (TROYER) 07 September 1976, see figures.	1-10

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
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Date of the actual completion of the international search

15 OCTOBER 1998

Date of mailing of the international search report

29 OCT 1998

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